



Department of Electrical and Electronics Engineering

EE8601 – SOLID STATE DRIVES

UNIT I

DRIVE CHARACTERISTICS

1. The travelling speed of cranes varies from

- (a) 20 to 30 m/s
- (b) 10 to 15 m/s
- (c) 5 to 10 m/s
- (d) 1 to 2.5 m/s**

Answer: (d)

2. Which of the following motors is preferred when quick speed reversal is the main consideration?

- (a) Squirrel cage induction motor
- (b) Wound rotor induction motor
- (c) Synchronous motor
- (d) D.C. motor**

Answer: (d)

3. For crane travel which of the following motors is normally used ?

- (a) Synchronous motor
- (b) D.C. differentially compound motor
- (c) Ward-Leonard controlled D.C. shunt motor
- (d) A.C. slip ring motor**

Answer: (d)

4. The capacity of a crane is expressed in terms of

- (a) type of drive
- (b) span
- (c) tonnes**
- (d) any of the above

Answer: (c)

5. The characteristics of drive for crane hoisting and lowering are which of the following?

- (a) Precise control
- (b) Smooth movement
- (c) Fast speed control
- (d) All of the above**

Answer: (d)

6. Which of the following motor is preferred for boom hoist of a travelling crane ?

- (a) Single phase motor
- (b) Synchronous motor
- (c) A.C. slip-ring motor**
- (d) Ward-Leonard controlled D.C. shunt motor

Answer: (c)

7. Which of the following motors has series characteristics ?

- (a) Shaded pole motor
- (b) Repulsion motor**
- (c) Capacitor start motor
- (d) None of the above

Answer: (b)

8. For a D.C. shunt motor which of the following is incorrect?

- (a) **Unsuitable for heavy duty starting**
- (b) Torque varies as armature current
- (c) Armature current is a straight line
- (d) Torque is zero for zero armature current

Answer: (a)

9. For which of the following applications motor has to start with high acceleration?

- (a) Oil expeller
- (b) Floor mill
- (c) **Lifts and hoists**
- (d) Centrifugal pump

Answer: (c)

10. Which of the following types of motor enclosure is safest ?

- (a) Totally enclosed
- (b) **Totally enclosed fan cooled**
- (c) Open type
- (d) Semi closed

Answer: (b)

ANSWER

11. While selecting motor for an air conditioner which of the following characteristics is of great importance?

- (a) Type of bearing
- (b) Type of enclosure

(c) **Noise**

(d) Arrangement for power transmission

Answer: (c)

12. The diameter of the rotor shaft for an electric motor depends on which of the following?

(a) r.p.m. only

(b) Horse power only

(c) **Horse power and r.p.m.**

(d) Horse power, r.p.m. and power factor

Answer: (c)

13. Which of the following alternatives will be cheaper?

(a) **A 100 H.P. A.C. three phase motor**

(b) Four motors of 25 H.P. each

(c) Five motors of 20 H.P. each

(d) Ten motors of 10 H.P. each

Answer: (a)

14. The cost of an induction motor will increase as

(a) **horsepower rating increases but r.p.m. decreases**

(b) horsepower rating decreases but r.p.m. increases

(c) horsepower rating and operating speed increases

(d) horsepower rating and operating speed decreases

Answer: (a)

15. In series motor which of the following methods can be used for changing the flux per pole ?

(a) Tapped field control

(b) Divertor field control

- (c) Series-parallel control
(d) Any of the above

Answer: (d)

16. Which of the following drives is suitable for mines where explosive gas exists?

- (a) Steam engine
(b) Diesel engine
(c) Battery locomotive
(d) Any of the above

Answer: (c)

17. The wheels of a train, engine as well bogies, are slightly tapered to

- (a) reduce friction
(b) increase friction
(c) facilitate braking
(d) facilitate in taking turns

Answer: (d)

18. Which of the following is the advantage of electric braking ?

- (a) It avoids wear of track.**
(b) Motor continues to remain loaded during braking.
(c) It is instantaneous.
(d) More heat is generated during breaking.

Answer: (a)

19. Which of the following braking systems on the locomotives is costly ?

- (a) **Regenerative braking on electric locomotives**
(b) Vacuum braking on diesel locomotive
(c) Vacuum braking on steam locomotive
(d) All braking systems are equally costly

Answer: (a)

20. Tractive effort is required to

- (a) overcome the gravity component of train mass
(b) overcome friction, windage and curve resistance
(c) accelerate the train mass
(d) **do all of the above**

Answer: (d)

21. For given maximum axle load, tractive efforts of A.C. locomotive will be

- (a) less than that of D.C. locomotive
(b) **more than that of D.C. locomotive**
(c) equal to that of D.C. locomotive
(d) none of the above

Answer: (b)

22. Co-efficient of adhesion reduces due to the presence of which of the following?

- (a) Sand on rails
(b) Dew on rails
(c) Oil on the rails
(d) **Dew and oil on the rails**

Answer: (d)

23. Due to which of the following coefficient of adhesion improves ?

- (a) Rust on the rails
- (b) Dust on the rails
- (c) Sand on the rails
- (d) All of the above**

Answer: (d)

24. Quadrilateral speed-time curve pertains to which of the following service?

- (a) Main lime service
- (b) Urban service
- (c) Sub-urban service
- (d) Urban and sub-urban service**

Answer: (d)

25. Which of the following is the disadvantage of electric traction over other systems of traction ?

- (a) Corrosion problems in the underground pipe work.
- (b) Short time power failure interrupts traffic for hours.
- (c) High capital outlay in fixed installations beside route limitation.
- (d) Interference with communication lines.
- (e) All of the above**

Answer: (e)

26. Speed-time curve of main line service differs from those of urban and sub-urban services on following account

- (a) it has longer free running period
- (b) it has longer wresting period
- (c) accelerating and braking periods are comparatively smaller
- (d) all of the above**

Answer: (d)

27. The rate of acceleration on suburban or urban services is restricted by the consideration of

- (a) engine power
- (b) track curve
- (c) passenger discomfort**
- (d) track size

Answer: (c)

28. Which of the following motors always starts on load ?

- (a) Conveyor motor
- (b) Floor mill motor
- (c) Fan motor
- (d) All of the above**

Answer: (d)

29. is preferred for automatic drives.

- (a) Squirrel cage induction motor
- (b) Synchronous motors
- (c) Ward-Leonard controlled D.C. motors**
- (d) Any of the above

Answer: (c)

30. When the load is above a synchronous motor is found to be more economical.

- (a) 2 kW
- (b) 20 kW
- (c) 50 kW
- (d) 100 kW**

Answer: (d)

31. While selecting an electric motor for a floor mill, which electrical characteristics will be of least significance?

- (a) Running characteristics
- (b) Starting characteristics
- (c) Efficiency
- (d) Braking**

Answer: (d)

32. Which of the following motors are preferred for overhead travelling cranes?

- (a) Slow speed motors
- (b) Continuous duty motors
- (c) Short time rated motors**
- (d) None of the above

Answer: (c)

33. Which of the following motors is used for elevators ?

- (a) Induction motor
- (b) Synchronous motor
- (c) Capacitor start single phase motor
- (d) Any of the above**

Answer: (d)

34. Which part of a motor needs maximum attention for maintenance?

- (a) Frame
- (b) Bearing**
- (c) Stator winding
- (d) Rotor winding

Answer: (b)

35.need frequent starting and stopping of electric motors.

- (a) Paper mills
- (b) Grinding mills**

- (c) Air-conditioners
- (d) Lifts and hoists**

Answer: (d)

36. Which feature, while selecting a motor for centrifugal pump, will be of least significance?

- (a) Starting characteristic
- (b) Operating speed
- (c) Horse power
- (d) Speed control**

Answer: (d)

37. The starting torque in case of centrifugal pumps is generally

- (a) less than running torque**
- (b) same as running torque
- (c) slightly more than running torque
- (d) double the running torque

Answer: (a)

38. Which of the following motors are best for the rolling mills ?

- (a) Single phase motors
- (b) Squirrel cage induction motors
- (c) Slip ring induction motors
- (d) D.C. motors**

Answer: (d)

39. The starting torque of a D.C. motor is independent of which of the following?

- (a) Flux
- (b) Armature current
- (c) Flux and armature current
- (d) Speed**

Answer: (d)

40. Rotor of a motor is usually supported onbearings.

- (a) **ball or roller**
- (b) needle
- (c) bush
- (d) thrust

Answer: (a)

41. A reluctance motor

- (a) is provided with slip rings
- (b) requires starting gear
- (c) has high cost
- (d) **is compact**

Answer: (d)

42. The size of an excavator is usually expressed in terms of

- (a) 'crowd' motion
- (b) angle of swing
- (c) **cubic metres**
- (d) travel in metres

Answer: (c)

43. For blowers which of the following motor is preferred ?

- (a) D.C. series motor
- (b) D.C. shunt motor
- (c) **Squirrel cage induction motor**
- (d) Wound rotor induction motor

Answer: (c)

44. Belted slip ring induction motor is almost invariably used for

- (a) water pumps
- (b) **jaw crushers**

- (c) centrifugal blowers
- (d) none of the above

Answer: (b)

45. Reluctance motor is a.....

- (a) variable torque motor
- (b) low torque variable speed motor
- (c) self starting type synchronous motor**
- (d) low noise, slow speed motor

Answer: (c)

46. In jaw crushers motor has to often start against..... load.

- (a) heavy**
- (b) medium
- (c) normal
- (d) low

Answer: (a)

47. For a motor-generator set which of the following motors will be preferred ?

- (a) Synchronous motor**
- (b) Slip ring induction motor,
- (c) Pole changing induction motor
- (d) Squirrel cage induction motor

Answer: (a).

48. Which of the following motor is usually preferred for kiln drives?

- (a) Cascade controlled A.C. motor
- (b) Slip-ring induction motor
- (c) Three phase shunt wound commutator motor
- (d) Any of the above**

Answer: (d)

49. Heat control switches are used in

- (a) transformers
- (b) cooling ranges**
- (c) three phase induction motors
- (d) single phase

Answer: (b)

50. In which of the following applications the load on motor changes in cyclic order ?

- (a) Electric shovels
- (b) Cranes
- (c) Rolling mills
- (d) All of the above**

Answer: (d)

51. Which of the following machines has heavy fluctuation of load ?

- (a) Printing machine
- (b) Punching machine**
- (c) Planer
- (d) Lathe

Answer: (b)

52. In..... the speed can be varied by changing the position of brushes.

- (a) slip ring motor
- (b) schrage motor**
- (c) induction motor
- (d) repulsion motor

Answer: (b)

53. In which of the following applications variable speed operation is preferred ?

- (a) Exhaust fan
- (b) Ceiling fan**

- (c) Refrigerator
- (d) Water pump

Answer: (b)

54. Heavy duty cranes are used in

- (a) ore handling plants
- (b) steel plants
- (c) heavy engineering workshop
- (d) all of the above**

Answer: (d)

55. The specific energy consumption of a train depends on which of the following?

- (a) Acceleration and retardation
- (b) Gradient
- (c) Distance covered
- (d) All of the above**

Answer: (d)

56. The friction at the track is proportional to

- (a) 1/speed
- (b) speed**
- (c) 1/speed²
- (d) none of the above

Answer: (b)

57. The air resistance to the movement of the train is proportional to

- (a) 1/speed
- (b) speed

- (c) **speed²**
(d) none of the above

Answer: (c)

58. The normal value of adhesion friction is

- (a) 0.12
(b) **0.25**
(c) 0.40
(d) 0.75

Answer: (b)

59. The resistance encountered by a train in motion is on account of

- (a) resistance offered by air
(b) friction at the track
(c) friction at various parts of the rolling stock
(d) all of the above

60. method can bring the locomotive to dead stop.

- (a) **Plugging braking**
(b) Rheostatic braking
(c) Regenerative braking
(d) None of the above

Answer: (a)

61. The value of co-efficient of adhesion will be high when rails are

- (a) greased
(b) wet
(c) sprayed with oil
(d) **cleaned with sand**

Answer: (d)

62. For three-phase induction motors which of the following is the least efficient method of speed control ?

- (a) Cascade control
- (b) Pole changing
- (c) Rheostatic control**
- (d) Combination of cascade and pole changing

Answer: (c)

63. Specific energy consumption becomes

- (a) more on steeper gradient
- (b) more with high train resistance
- (c) less if distance between stops is more
- (d) all of the above**

Answer: (d)

64. In main line service as compared to urban and suburban service

- (a) distance between the stops is more
- (b) maximum speed reached is high
- (c) acceleration and retardation rates are low
- (d) all of the above**

Answer: (d)

65. Locomotive having monomotor bogies

- (a) has better co-efficient of adhesion
- (b) are suited both for passenger as well as freight service

- (c) has better riding qualities due to the reduction of lateral forces
(d) has all above qualities

Answer: (d)

66. Energy consumption in propelling the train is required for which of the following

- (a) Work against the resistance to motion
(b) Work against gravity while moving up the gradient
(c) Acceleration
(d) All of the above

Answer: (d)

67. An ideal traction system should have

- (a) easy speed control
(b) high starting tractive effort
(c) equipment capable of withstanding large temporary loads
(d) all of the above

Answer: (d)

68.have maximum unbalanced forces.

- (a) Diesel shunters
(b) Steam locomotives
(c) Electric locomotives
(d) Diesel locomotives

Answer: (b)

69. Specific energy consumption is affected by which of the following factors ?

- (a) Retardation and acceleration values
- (b) Gradient
- (c) Distance between stops
- (d) All of the above

70. In case of free running and coasting periods are generally long.

- (a) main-line service**
- (b) urban service
- (c) sub-urban service
- (d) all of the above

Answer: (a)

71. Specific energy consumption is least in service.

- (a) main line**
- (b) urban
- (c) suburban

Answer: (a)

72. Locomotives with monomotor bogies have

- (a) uneven distribution of tractive effect
- (b) suitability for passenger as well as freight service**
- (c) lot of skidding
- (d) low co-efficient of adhesion

Answer: (b)

73. was the first city in India to adopt electric traction.

- (a) Delhi
- (b) Madras
- (c) Calcutta
- (d) Bombay**

Answer: (d)

74. Power for lighting in passenger coach, in a long distance electric train, is provided

- (a) directly through overhead electric line
- (b) through individual generator of bogie and batteries**
- (c) through rails
- (d) through locomotive

Answer: (b)

75. Which of the following happens in Kando system?

- (a) Three phase AC. is converted into D.C.
- (b) Single phase AC. is converted into D.C.
- (c) Single phase supply is converted into three phase system**
- (d) None of the above

Answer: (c)

76. For which of the following locomotives the maintenance requirements are the least ?

- (a) Steam locomotives
- (b) Diesel locomotives
- (c) Electric locomotives**
- (d) Equal in all of the above

Answer: (c)

77. Which of the following methods is used to control speed of 25 kV, 50 Hz single phase traction ?

- (a) Reduced current method
- (b) Tap changing control of transformer**

- (c) Series parallel operation of motors
- (d) All of the above

Answer: (b)

78. If the co-efficient of adhesion on dry rails is 0.26, which of the following could be the value for wet rails?

- (a) 0.3
- (b) 0.26
- (c) 0.225
- (d) 0.16**

Answer: (d)

79. The braking retardation is usually in the range of

- (a) 0.30 to 0.6 km phps
- (b) 0.8 to 2.4 km phps
- (c) 3 to 5 km phps**
- (d) 10 to 15 km phps

Answer: (c)

80. The rate of acceleration on suburban or urban service is in the range

- (a) 0.2 to 0.6 km phps
- (b) 1.6 to 4.0 km phps
- (c) 5 to 10 km phps
- (d) 15 to 26 km phps

81. The coasting retardation is around

- (a) 0.16 km phps**
- (b) 1.6 km phps

- (c) 16 km phps
- (d) 40 km phps

Answer: (a)

82. is the method of braking in which motor armature remains connected to the supply and draws power from it producing torque opposite to the direction of motion.

- (a) Rheostatic braking
- (b) Regeerative braking
- (c) **Plugging**

Answer: (c)

83. Besides a constant speed a synchronous motor possesses which of the following advantages?

- (a) Lower cost
- (b) Better efficiency
- (c) **High power factor**
- (d) All of the above

Answer: (c)